

**I/WE CLAIM:**

1. A method for protecting a photodiode of an optical receiver from overload optical signals, comprising:  
providing a feedback control loop for controlling a gain of the photodiode by monitoring an operating parameter of the photodiode, and computing and applying an optimal gain setting in accordance with changes in the operating parameter;  
using the operating parameter to detect a potential overload state in which the photodiode is susceptible to optical overload; and  
controlling the feedback control loop so that if the potential overload state is detected, the feedback control loop is preempted and a predetermined safe gain setting is applied to the photodiode.
2. The method as claimed in claim 1 wherein the photodiode is an avalanche photodiode (APD), and the step of controlling comprises controlling a bias control circuit that modulates a reverse bias voltage across a depletion region of the APD.
3. The method as claimed in claim 2 wherein detecting the potential overload state comprises measuring an optical power incident the photodiode.
4. The method as claimed in claim 3 wherein monitoring the potential overload state further comprises measuring an operating temperature of the photodiode.

5. The method as claimed in claim 3 further comprising determining that the measured optical power indicates that the photodiode is susceptible of overload when the measured optical power falls below a threshold that is associated with a loss of signal condition during which no signal is received at the photodiode.
6. The method as claimed in claim 5 wherein overriding the feedback control loop to apply the predetermined safe gain setting to the APD comprises setting the reverse bias voltage to a predefined low sensitivity gain setting throughout the loss of signal condition.
7. The method as claimed in claim 3 further comprising determining that the measured optical power indicates that the photodiode is susceptible of overload when the measured optical power is above an overload threshold that is associated with an overload condition.
8. The method as claimed in claim 7 wherein overriding the feedback control loop to apply the predetermined safe gain setting to the APD comprises deactivating the photodiode when the overload optical signal condition is detected.
9. The method as claimed in claim 8 further comprising raising an alarm that can only be cleared by network management after deactivating the photodiode.
10. An apparatus for protecting a variable gain photodiode of an optical receiver from overload optical signals, the apparatus comprising:

a feedback control circuit for controlling a gain of the photodiode in response to an operating parameter of the photodiode;

a state detector for detecting if the operating parameter indicates that the photodiode is in a potential overload state in which the photodiode is susceptible to overload, and for issuing an override command over the continuous feedback control circuit to apply a predetermined safe gain setting to the photodiode when the potential overload state is detected.

11. The apparatus as claimed in claim 10 wherein the photodiode is an avalanche photodiode (APD), and the feedback control circuit comprises a bias control circuit that modulates a reverse bias voltage across a depletion region of the APD.
12. The apparatus as claimed in claim 10 wherein the state detector comprises an optical power monitor that computes an optical power incident the photodiode.
13. The apparatus as claimed in claim 12 wherein the state detector computes a mean optical power incident the photodiode, and determines that the photodiode is in a potential overload state if the computed optical power falls below a loss of signal threshold during which no optical signal is received.
14. The apparatus as claimed in claim 13 wherein the state detector further determines that the measured optical power indicates that the photodiode is

susceptible of overload when the measured optical power falls below a threshold that is associated with a loss of signal condition.

15. The apparatus as claimed in claim 14 wherein the state detector also issues a command to the photodiode to fix a sensitivity of the photodiode to the predetermined safe gain setting in the event that the state detector determines that the measured optical power falls below the LOS threshold.
16. The apparatus as claimed in claim 13 wherein the state detector determines that the measured optical power indicates that the photodiode is susceptible of overload when the computed optical power is above an overload threshold that is associated with an overload condition.
17. The apparatus as claimed in claim 16 wherein the state detector issues a command to the photodiode to deactivate the photodiode when the computed optical power is above the overload threshold.
18. The apparatus as claimed in claim 17 wherein the state detector raises an alarm that must be cleared by network management after deactivating the photodiode.
19. A photodetector for converting an optical signal into an electrical signal, the photodetector comprising:  
a variable gain photodiode that converts the optical signal to an analog electrical signal, and

outputs the electrical signal on a receiver circuit; and

a state detector for:

monitoring an operating parameter of the photodiode;

determining if the operating parameter indicates a potential overload state in which the photodiode is susceptible to overload; and

applying a predetermined safe gain setting to the photodiode, if the potential overload state is detected.

20. The photodetector as claimed in claim 19 wherein the state detector:

monitors an optical power incident the photodiode;

compares the optical power with both a loss of signal (LOS) threshold and an overload signal threshold;

applies a low sensitivity gain setting if the optical power is below the LOS threshold; and

deactivates the photodiode if the optical power is above the overload signal threshold.